

- 18 -

Claims:

1. An electrochemical cell comprising:
 - a membrane electrode assembly;
 - a first reactant flow field plate for providing a first reactant flow
 - 5 field disposed on one side of the membrane electrode assembly;
 - a first seal disposed between the first reactant flow field plate
 - and the membrane electrode assembly for impeding leakage of process fluids
 - of the electrochemical cell;
 - a first gas diffusion layer disposed between the first reactant
 - 10 flow field plate and the membrane electrode assembly for diffusing reactant
 - from the first reactant flow field to the membrane electrode assembly;
 - a second reactant flow field plate for providing a second reactant
 - flow field disposed on the other side of the membrane electrode assembly;
 - and,
 - 15 a peripheral support structure for supporting the membrane
 - electrode assembly at a periphery between the first reactant flow field and the
 - first seal to impede substantial distortion of the membrane electrode assembly
 - between the first reactant flow field and the first seal.
2. An electrochemical cell as claimed in claim 1 wherein
 - 20 the first gas diffusion layer comprises a porous body for diffusing
 - the reactant from the reactant flow field to the membrane electrode assembly;
 - the peripheral support structure comprises an edge portion of
 - the first gas diffusion layer; and,
 - the edge portion surrounds the porous body.

- 19 -

3. An electrochemical cell as claimed in claim 2 where in a thickness of the edge portion is reduced from one side of the porous body to provide a step between the porous body and the edge portion.
4. An electrochemical cell as claimed in claim 3 wherein
- 5 the first gas diffusion layer comprises a first side facing the reactant flow field plate and a second side facing the membrane electrode assembly;
- the step is on the first side of the first gas diffusion layer; and,
- the edge portion abuts the seal.
- 10 5. An electrochemical cell as claimed in claim 3 wherein
- the first gas diffusion layer comprises a first side facing the reactant flow field plate and a second side facing the membrane electrode assembly;
- the step is provided on the second side of the first gas diffusion
- 15 layer; and,
- the peripheral support structure further comprises a sealing insert provided on the edge portion to impede leakage of the process fluids.
6. An electrochemical cell as claimed in claim 5 wherein the sealing insert has a thickness substantially equal to a height of the step, such
- 20 that the second side of the first gas diffusion layer and the sealing insert provide a substantially flat surface for supporting the membrane electrode assembly.
7. An electrochemical cell as claimed in claim 6 wherein the seal is a sealing gasket and the sealing insert comprises a slot for accommodating
- 25 the sealing gasket.

- 20 -

8. An electrochemical cell as claimed in claim 7 wherein the sealing insert has a thickness substantially equal to a thickness of the porous body and has an insert step for engaging the step on the gas diffusion layer.

9. An electrochemical cell as claimed in claim 5 wherein the sealing insert is substantially impermeable to the process fluids.

10. An electrochemical cell as claimed in claim 9 wherein the sealing insert comprises a silk screened gasket.

11. A method of impeding leakage of process fluids from an electrochemical cell having a membrane electrode assembly, a first reactant flow field plate for providing a first reactant flow field disposed on one side of the membrane electrode assembly, a seal disposed between the first reactant flow field plate and the membrane electrode assembly for impeding leakage of process fluids of the electrochemical cell, and a second reactant flow field plate for providing a second reactant flow field disposed on the other side of the membrane electrode assembly; the method comprising:

providing a gas diffusion layer disposed between the first reactant flow field and the membrane electrode assembly; and,

providing the gas diffusion layer with an edge portion for supporting the membrane electrode assembly at a periphery between the reactant flow field and the seal to impede substantial distortion of the membrane electrode assembly between the reactant flow field and the seal.

12. The method as defined in claim 11, wherein the edge portion is substantially impermeable to process fluids.

13. The method as defined in claim 11, wherein the edge portion comprises a liquid silicone gasket for impeding leakage of the process fluids.

14. The method as defined in claim 11, wherein the edge portion comprises a silk screened gasket for impeding leakage of the process fluids.

- 21 -

15. The method as defined in claim 11, wherein the edge portion surrounds a porous body, the porous body being permeable to the process fluids; and

the edge portion is thinner than the porous body.

5 16. The method as defined in claim 15, wherein

the edge portion is substantially impermeable to process fluids;

the porous body comprises a first side and a second side; and,

the thickness of the edge portion is reduced from the second side to provide a step in the second side.

10 17. The method as defined in claim 16 wherein the step of providing the gas diffusion layer comprises installing the gas diffusion layer such that the first side faces the membrane electrode assembly and the edge portion faces the seal.

18. The method as defined in claim 16 wherein

15 the step of providing the gas diffusion layer comprises installing the gas diffusion layer such that the second side faces the membrane electrode assembly;

the method further comprises providing a sealing insert on the edge portion to impede leakage of process fluids, and

20 the sealing insert is substantially impermeable to process fluids and engages the step of the edge portion.

19. The method as defined in claim 18 wherein the sealing insert has an insert thickness substantially equal to a height of the step and the method further comprises installing the sealing insert and the gas diffusion
25 layer such that the second side of the gas diffusion layer and the sealing

- 22 -

ins it provide a substantially flat surface for supporting the membrane electrode assembly.

20. A gas diffusion layer for an electrochemical cell comprising
a first side for receiving process fluids of the electrochemical
5 cell;
a second side opposite to the first side;
a porous body for diffusing the process fluids from the first side
to the second side, the porous body being electrically conductive, and
an edge portion surrounding the porous body, wherein the edge
10 portion is substantially impermeable to the process fluids.
21. A gas diffusion layer as claimed in claim 20, wherein the edge
portion is thinner than the porous body.
22. A gas diffusion layer as claimed in claim 21, wherein the edge
portion comprises a silk screened gasket for impeding leakage of the process
15 fluids.
23. A gas diffusion layer as claimed in claim 20, wherein the edge
portion comprises a silk screened gasket for impeding leakage of the process
fluids.
24. A gas diffusion layer as claimed in claim 20, wherein the edge
20 portion comprises a silicone gasket.
25. A gas diffusion layer as claimed in claim 20, wherein a thickness
of the edge portion is reduced from one side of the porous body to provide a
step between the porous body and the edge portion.
26. A gas diffusion layer as claimed in claim 20, wherein th gas
25 diffusion layer is a single unitary body.

- 23 -

27. A gas diffusion layer for an electrochemical cell comprising
a first side for receiving process fluids of the electrochemical
cell;

a second side opposite to the first side;

5 a porous body for diffusing the process fluids from the first side
to the second side, the porous body being electrically conductive, and,

an edge portion surrounding the porous body, wherein a
thickness of the edge portion is reduced from one side of the porous body to
provide a step between the porous body and the edge portion.

10 28. A gas diffusion layer as claimed in claim 27, wherein the edge
portion is substantially impermeable to the process fluids.

29. A gas diffusion layer as defined in claim 28, wherein the edge
portion comprises one of a liquid silicone gasket for impeding leakage of the
process fluids, and a silk screen gasket for impeding leakage of the process
15 fluids.

30. A gas diffusion layer as claimed in claim 27, wherein the gas
diffusion layer is a single unitary body.